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**APPLICATION FOR UNITED STATES
LETTERS PATENT**

LIFTING DEVICE

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LIFTING DEVICE

Field Of The Invention

5 This invention relates to a lifting device, and more particularly to a lifting device intended to assist individuals in rising from a seated position to a standing position.

Description Of Related Art

10 Various lifting devices have been proposed to assist individuals, notably the elderly, invalids or those recuperating from surgery, to rise from a seated position to a standing position. In particular, devices for this purpose have been proposed which make use of compressed air to inflate a cushion, which results in lifting of the user. Devices of this general type are disclosed, for example, in GB-A-941072, GB-A-1165740 and GB-A-2287878.

15 Whilst the broad concept of using an inflatable cushion to assist in the lifting of a user is disclosed in the prior art, the actual systems proposed in the prior art suffer from significant disadvantages. In this context, it must be remembered that the main users of devices of this type are likely to be old and frail. Accordingly, it is most important that the devices offer a high degree of stability and instill confidence in the users. A device, which feels unstable, is liable to be unacceptable to users, regardless of whether, in fact, there is any danger associated with its use. It must further be remembered that the device must be capable of being manufactured at reasonable cost and must give a reasonable life expectancy under relatively arduous conditions.

20 We have now devised an improved lifting device, which obviates the problems of the prior art.

SUMMARY OF THE INVENTION

25 In accordance with the first aspect of the present invention, a lifting device comprises a rigid base hingedly secured to a rigid seat, and an inflatable bag located between and secured to at least one of the rigid base and the rigid seat.

30 The provision of a rigid base, hingedly connected to a rigid seat, with an inflatable bag positioned between the base and seat, greatly enhances the stability of the device as compared

with inflatable cushions of the prior art which are inherently flexible. The person using the device of the present invention will not tend to rock from side to side as they are liable to do on a simple flexible inflatable cushion, and may press down on the rigid seat to assist final movement into the standing position. Further, when the device of the present invention is used in reverse, that is as an aid to lowering a user into a seat, the rigid seat provides a firm surface, which the user can touch or lightly support themselves on as they move into engagement with the lifting device.

The rigid seat is preferably covered with an appropriate cushion which may have a removable cover. The cushion can be designed to meet the particular comfort or nursing needs of a user. Accordingly, existing well-developed techniques for making comfortable seating can be applied to an embodiment of the present invention. This is not possible with prior art devices where the inflatable cushion lacks the rigid seat of the present invention.

In a particularly preferred embodiment of the invention the inflatable bag is a complete closed bag (aside, of course, from any necessary inlet or outlet connections). In other words, the bag is fabricated as a complete inflatable unit which is positioned between the rigid base and the rigid seat, rather than as a tube which is secured in airtight manner to the rigid base and the rigid seat. This arrangement considerably simplifies manufacture of the present invention and provides improved reliability against leakage. In effect, the inflatable bag can be completely manufactured using conventional materials and techniques by a manufacturer skilled in this technology, and can then be positioned as a complete unit between the rigid base and the rigid seat. Not only does this arrangement simplify manufacture, but it also enables the bag on the one hand and the rigid seat and rigid base on the other hand to be optimized for their particular intended purpose. In a preferred embodiment of the invention, the rigid base and rigid seat are, for example, thermoplastic moldings. The arrangements of the preferred embodiment in which the bag is a separate and self-contained unit means that the moldings can be optimized for comfort, durability, strength and cost without the constraints that would be imposed were the seat and base themselves to form part of the inflatable structure.

In a particularly preferred embodiment of the invention, the inflatable bag comprises a body, which is in the form of a portion of a tube, and respective ends which are planar. Preferably, the body is secured to each respective end by means of flaps of body material and end

material which are secured together to form an outwardly extending peripheral flange. This technique provides a highly reliable high strength bond between the material of the body and the material of the ends, and the flange provides a convenient means by which the inflatable bag may be secured to the rigid base and/or to the rigid seat.

5 In a particularly preferred embodiment of the invention, a recess is provided in the rigid base and/or in the rigid seat, the recess or each recess being sized to receive an end of the inflatable bag. The end of the inflatable bag may be secured in the recess by means of a rigid connecting ring which is secured by appropriate fastenings to the material of the base or seat as the case may be. In a particularly preferred embodiment of the invention in which the seat and
10 base are thermoplastics moldings, the fastenings may be in the form of snap-in retaining devices formed integrally with or secured to the rigid connecting ring. For example, the rigid connecting ring and retaining devices may be an integral plastics molding. The rigid base and/or rigid seat are preferably provided with apertures into which the retaining devices snap-fit. Such an arrangement facilitates a speedy and reliable method of securing the connecting ring to the rigid
15 base and/or rigid seat with portions of the bag flanges trapped therebetween. Preferably, the bag flanges are provided with through holes through which the retaining devices pass. This arrangement provides a high strength high stability connection between the inflatable bag and the base and/or the seat.

 Preferably, the rigid base is provided with locating means which provide for accurate
20 location of the lifting device on an existing chair structure. The locating means can conveniently take the form of one or more lugs which depend from the rigid base to be engaged against a front surface of an existing chair structure. The lug or each lug may conveniently also serve as a handle for transporting the device and to this end is preferably provided with holes through which the fingers may be passed to facilitate carrying the device by means of the handles.

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BRIEF DESCRIPTION OF THE DRAWINGS

 The invention will be better understood from the following description of a preferred
30 embodiment thereof, given by way of example only, reference being had to the accompanying

drawings wherein:

Figure 1 illustrates schematically in an exploded perspective view of a preferred embodiment of the invention; and

Figures 2 and 3 are respectively rear and front perspective views of a preferred embodiment of the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to the drawings, the illustrated lifting device 1 is particularly suitable for use by elderly or frail individuals or those recuperating from a surgical operation, to assist the user in rising from the seated position to a standing position and vice versa. The device comprises a rigid base 2 which, in the assembled device, is secured to a rigid seat 3 by means of hinges 4. In a preferred embodiment of the invention illustrated in the drawings, the rigid base 2 and rigid seat 3 are respective plastics moldings and the hinge 4 is formed by projections 4A which are integral with the moldings and a hinge pin 4B which interconnects the projections 4A to form the hinge 4.

It is to be understood, however, that other arrangements are possible. In particular, the hinge may be designed so that the edges of the base and the seat are, in the assembled condition of the device, somewhat spaced apart. For example, one or more spacer members may be hingedly connected to the base and hingedly connected to the seat to provide a compound hinge which connects the base to the seat. All such arrangements are within the scope of the present invention. Further, although in the preferred embodiment of the invention the base 2 and seat 3 are molded from plastics material, other arrangements are possible. For example, one or both of the components may be formed of plywood or similar material suitably machined and furnished with separate hinges.

Located between the rigid base and the rigid seat is an inflatable bag 5. The bag 5 comprises a body 6, which is a section of a tube. The tube may be a straight tube or may be curved. In other words, when viewed in longitudinal cross-section the opposite edges of the tube may be straight or curved. The inflatable bag 5 also comprises ends 7,8. The ends are generally planar if the bag is in the erect configuration illustrated in the drawing, but not subject to significant internal pressure. The bag is formed by forming the body 6 by any suitable

conventional technique and then joining the ends of the body to the peripheral regions of the ends 7,8 to form outwardly projecting flanges 9,10. The bag may be formed from any suitable material, for example a rubberized canvas material or a synthetic plastics material.

5 An inflation/deflation fitting 11 is secured to the lower end 7 of the inflatable bag and, in use, is connected to tubing 12 for the supply of inflation air to or the removal of inflation air from the interior of the bag.

The base 2 and seat 3 are formed with recesses 13 (only the recess in the base is visible in the drawing), the recesses being shaped to receive the respective ends 7, 8.

10 During manufacture, the inflatable bag is formed as a complete unit using appropriate manufacturing techniques and is then offered up to the pre-assembled base and seat. The respective flanges 9,10 of the inflatable bag are secured in their associated recesses by means of flange rings 14 which are secured to the base or seat by means of suitable fastenings which pass through apertures provided in the flanges 9,10.

15 In a preferred embodiment of the invention, the flange rings 14 are plastics moldings and the fastenings are in the form of snap-fit studs 15 which are molded integrally with the flange rings 14. Appropriate apertures 16 are provided in the base 2 and seat 3 into which the studs 15 may be snap-fitted. This technique provides a simple and robust means for connecting the inflatable bag to the base and seat. The resulting unit comprising the base 2, seat 3, bag 5 and associated fittings is robust and highly stable in use.

20 In general, it is preferred that a cushion 17 is secured to the seat 3 to provide enhanced comfort for the user. Because the cushion is functionally independent of the lifting device the cushion may be designed to take into account conventional cushion technology to provide the optimum level of comfort or therapeutic effect for the user of the device.

25 In general, the device of the present invention will be used in association with an existing chair. To this end, in use, the base 2 will be placed on the seat of an existing chair. Because of the rigid nature of the base 2 it will in general form a stable platform when placed on top of the compressible cushion of an existing chair. Preferably, however, a lug 18 will be secured to the front edge 19 of the base to ensure accurate location of the front edge 19 relative to the front edge of the existing chair. Preferably, the lug 18 is fashioned as a handle, which can be used for
30 lifting and carrying the lifting device.

In use, the lifting device will have associated with it a source of compressed air and means for controlling the flow of air to and from the bag 5. The source of compressed air can conveniently be a small electrically driven compressor and the control means can conveniently be in the form of a switch and valve gear controlled by the switch. When a patient seated on the cushion 17 wishes to rise he will activate the switch to energize the pump and admit compressed air to the bag 5 via the tube 12 and fitting 11. At any stage, inflation motor can be stopped and the device can enter a hold mode in which no air is forced into or permitted to flow from the bag 5. As the bag 5 inflates the angle between the base 2 and the seat 3 will increase and the user will be gently raised from the original sitting position to a near upright standing position. At any stage during this operation, the user may steady themselves or assist themselves in standing by pressing down on the cushion 17 which will be firmly supported by the seat 3. Preferably, a timer or a pressure sensor will be incorporated within the inflation mechanism to limit inflation of the bag 5.

When a user wishes to return to the seated position he will first ensure that the bag is fully inflated and will then rest his buttocks against the cushion 17. He will then activate the control mechanism to release air from the bag 5. The release may be effected simply by venting air from the bag 5 so that it collapses under the imposed load of the user, or may comprise a mechanism for extracting air from the bag 5, for example by use of a pump. The process continues until the bag 5 is fully deflated and the user is fully seated on the cushion 7 which will, at this stage, be substantially horizontal.